

## Radiation Tolerant Low Power Precision Time Source, Phase I

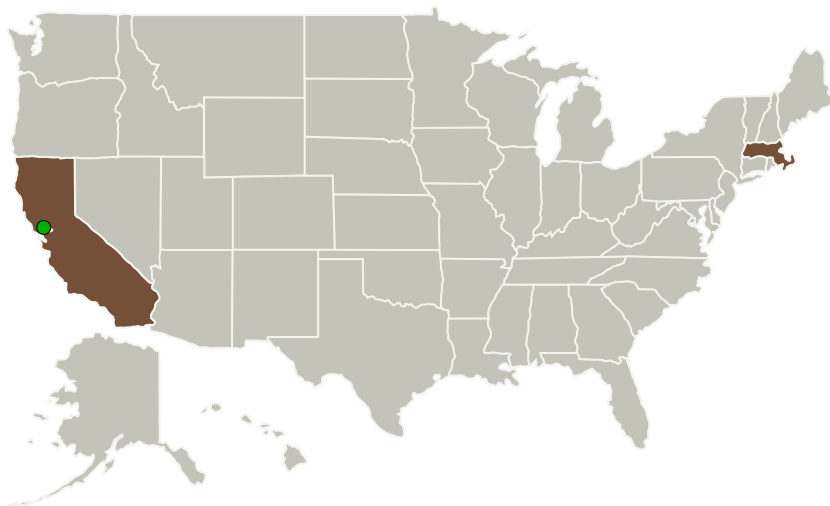
Completed Technology Project (2010 - 2010)



## Project Introduction

The availability of small, low power atomic clocks is now a reality for ground-based and airborne navigation systems. Kernco's Low Power Precision Time Source (LPPTS) is based on Coherent Population Trapping (CPT) technology. Several of these units were recently delivered to the Air Force Research Laboratory (AFRL) at Kirtland Air Force Base and have demonstrated the performance and robustness of the matured design. Since CPT technology has been demonstrated as a viable solution to providing low-power, high-performance atomic clocks, it makes sense to explore the potential for deploying these units for space operations. Size, Weight and Power (SWAP) rank among the highest of the critical parameters in the design and fabrication process of a satellite system. However, the single most critical parameter is perhaps the radiation tolerance of any electronic system. By using the LPPTS design as a point of departure, Kernco proposes to implement a radiation tolerant design of its CPT-Based Atomic Clock to satisfy the need for Low Cost, High Accuracy Timing Signals for small satellite flight opportunities. This SBIR Phase I proposal will focus on the design of a Radiation Tolerant Low Power Precision Time Source (LPPTS-R) suitable for integration into the Space Plug-and-Play Architecture (SPA).

## Primary U.S. Work Locations and Key Partners



Radiation Tolerant Low Power  
Precision Time Source, Phase I

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Organizations Performing Work	Role	Type	Location
Kernco, Inc.	Lead Organization	Industry	Danvers, Massachusetts
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Massachusetts

## Project Transitions

**January 2010:** Project Start**July 2010:** Closed out**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/139374>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

Kernco, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

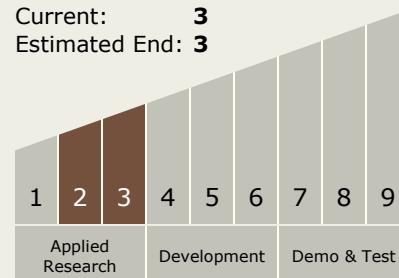
Carlos Torrez

**Principal Investigator:**

Daniel Janssen

## Technology Maturity (TRL)

Start: 2  
 Current: 3  
 Estimated End: 3



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## Technology Areas

### Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - └ TX05.4 Network Provided Position, Navigation, and Timing
    - └ TX05.4.1 Timekeeping and Time Distribution

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System